UCRL-ID-141404

DAF Glovebox Project Plan

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November 14, 2000

U.S. Department of Energy

Lawrence
Livermore
National
Laboratory

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DAF Glovebox
Project Plan

November 14, 2000
Revision 0

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Acronyms

AGS	American Glovebox Society
ASTM	American Society for Testing and Materials
ATP	Acceptance Test Procedure
BN	Bechtel Nevada
CAM	Continuous Air Monitor
DAF	Device Assembly Facility
DNT	Defense and Nuclear Technologies
DOE/NV	Department of Energy/ Nevada Operations Office
DSW	Directed Stockpile Work
EIS	Environmental Impact Statement
ES&H	Environment, Safety, and Health
FORC	Facility Operations Review Committee
HAR	Hazard Analysis Report
HEPA	High-Efficiency Particulate Air
ISM	Integrated Safety Management
JASPER	Joint Actinide Shock Physics Experimental Research
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
M&O	Management and Operating
MRP	Management Prestart Review
NEPA	National Environmental Policy Act
NTS	Nevada Test Site
ORR	Operational Readiness Review
PC	Performance Category
PHA	Preliminary Hazard Analysis
REOP	Real Estate/ Operations Permit
RFP	Request For Proposal

RTBF	Readiness in Technical Base and Facilities
SCE	Subcritical Experiment
SDD	System Design Description
SNM	Special Nuclear Material
SSC	Structure, System, or Component
SST	Safe Secure Transport
USQ	Unreviewed Safety Question
WBS	Work Breakdown Structure
WG	Water Gauge

Executive Summary

A new glovebox capability is to be located in Building 341 of the Device Assembly Facility (DAF) at the Nevada Test Site (NTS). This capability is required for target assembly and inspection work in support of the Joint Actinide Shock Physics Experimental Research (JASPER) facility, currently scheduled to become operational in late 2001. Glovebox operations to support the JASPER project and other future projects have been determined to be compatible with the mission of the DAF.

For successful project planning purposes, several significant issues have been identified and must be agreed to by the responsible organizations. This project plan serves as the tool to document these issues and organizational agreements to achieve the project objectives.

Organizations involved in glovebox start-up

Lawrence Livermore National Laboratory (LLNL) is the lead Laboratory for the glovebox start-up effort, which includes participation of Los Alamos National Laboratory (LANL), Bechtel Nevada (BN), and Department of Energy/ Nevada Operations Office (DOE/NV) employees. LLNL has two significant responsibilities with respect to the glovebox project: lead Lab responsibility for the project, and lead Lab responsibility for management of DAF operations. LANL primarily provides expertise in glovebox design and operation. BN will provide construction support to modify Building 341 to accommodate the glovebox capability, as well as glovebox installation. DOE/NV provides oversight. The DOE/NV Manager will be the start-up authority for the glovebox operation.

Design criteria

The gloveboxes and associated systems have been designed to comply with the following design standards and guidelines:

- DOE O 6430.1A, *General Design Criteria.*
- DOE O 420, *Facility Safety.*
- DOE G 420.1-1, *Nonreactor Nuclear Safety Design Criteria and Explosive Safety Criteria for Use with DOE O 420.1, Facility Safety.*
- AGS-G001, *Guideline for Gloveboxes.*
- DOE-STD-1020-94, *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities.*

Facility categorization/ hazard analysis documentation

For purposes of project planning, the "glovebox facility" (Building 341) will be treated as a Category 3 nuclear facility. The material quantities to be present exceed the limits for a Category 3 facility as specified in Attachment 1 of DOE-STD-1027-92 (Ref. 1). The project will be introduced into the DAF using the unreviewed safety question (USQ)

process, as defined in the current DAF Safety Analysis Report (Ref. 2). The DAF SAR is currently undergoing revision that will likely recategorize the facility from a moderate-hazard explosives facility to a Category 2 nuclear facility. It is important to note that the update of the DAF SAR is occurring concurrently with, yet independently from, the glovebox project. The glovebox project will prepare a separate safety analysis document that includes hazard and accident analyses. This document will include those topics contained in Chapters 2 through 5 of DOE-STD-3009-94 (Ref. 3). The contents of this document will be incorporated into the updated DAF SAR during a future revision.

Formal readiness review process

As the introduction of the glovebox capability is essentially adding a new Category 3 nuclear facility into the DAF, the requirements of DOE O 425.1A (Ref. 4) shall apply. As a Category 3 nuclear facility, operations in the glovebox require formal Contractor Operational Readiness Review (CORR) and DOE Operational Readiness Review (ORR) processes to assure readiness prior to authorization to operate. These reviews shall apply the graded approach. The scope of these reviews will be limited to those processes, equipment, and related activities associated with the new glovebox capability. The readiness review process is the responsibility of the DAF Manager.

Path to completion

Figure E-1 is a flowchart of the key tasks required to bring the DAF glovebox capability online. This schematic includes the DAF work control and authorization processes used to introduce and review the glovebox and building modifications prior to approval. Each of the elements in this flowchart is described in greater detail in the body of this project plan. The schedule to complete the glovebox project has been defined to meet the JASPER shot schedule.

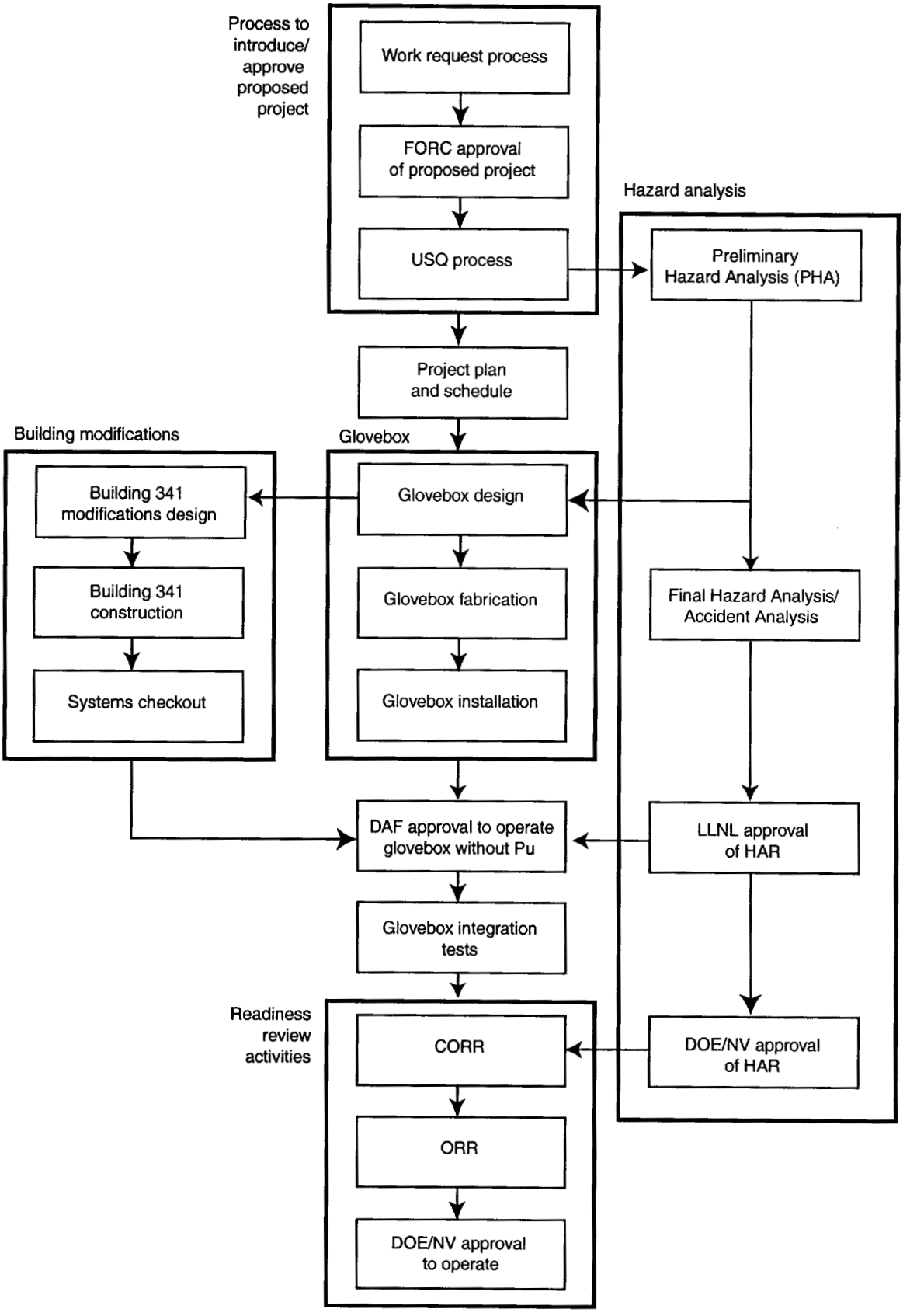

Figure E-1. Process flowchart for bringing DAF glovebox capability online.

1. Project Overview

In 1998, Lawrence Livermore National Laboratory (LLNL) and Los Alamos National Laboratory (LANL) (the Laboratories) identified the need to locate a glovebox capable of handling plutonium and other actinides at the Nevada Test Site (NTS). Several ongoing programs at the NTS would benefit from this capability, particularly the Joint Actinide Shock Physics Experimental Research (JASPER) project located in Area 27, and the subcritical experiments (SCEs) conducted at the underground U1a Complex in Area 1. Both of these projects support the science-based Stockpile Stewardship Program.

The JASPER project will use a two-stage, light-gas gun to study the properties of plutonium and other elements at conditions of extreme temperature and pressure. During operation, the gun will shoot a projectile into an actinide target at velocities up to 8 km/s, inducing pressures in the target material up to 6 Mbar. Due to exacting target requirements, it is advantageous to have the target assembled, inspected, and placed into its housing (i.e., target subassembly) in a location near the JASPER facility. Shipping targets from either of the Laboratories' plutonium facilities would present several technical difficulties, including assuring proper alignment of the target relative to the target assembly as well as maintaining a pristine target surface during transport. Furthermore, LLNL experience indicates that most epoxies used in the target assembly process will degrade in a radiation environment. Without a local glovebox capability, targets would have to be installed and epoxied in place at either Laboratory. Only individual target assemblies could be shipped, which would greatly increase shipping costs and significantly complicate scheduling. As JASPER anticipates executing experiments every other week, it would be preferable to ship several actinide targets at a time and stage them at the NTS.

The SCE program also uses small-geometry plutonium targets to study material properties at high pressures. Currently, these experiments are shipped to the NTS via a Safe Secure Transport (SST). An NTS glovebox capability could allow a change in the experiment preparation process that would result in significant cost savings.

The Device Assembly Facility (DAF), in Area 6 of the NTS, has been selected as the best location to house the glovebox. The DAF is the approved location for nuclear explosive operations at the NTS and has been used for the preparation of SCE assemblies. In addition, the DAF has the capacity and infrastructure to accommodate this new capability. In FY00, DOE/NV funded the glovebox project at ~ $2.9M over an 18-month period ($500K was received in FY00, and $2.4M is programmed for FY01). The glovebox project was funded as a facility upgrade to the DAF, and will serve as a joint-Laboratory resource when completed. As the glovebox will initially be used to fabricate target assemblies for the JASPER gas gun, the JASPER project is the primary driver for schedule and design considerations.

The glovebox project will locate two plutonium gloveboxes in Building 341 of the DAF. This building is currently designated as an assembly bay, with access to the south corridor (see Figure 1-1). The operating area of Building 341 measures 30 ft (w) ×

28 ft (l) × 30 ft (h) (excluding the vestibule), with 30-in.-thick concrete walls. Separate personnel and equipment airlocks and special double doors ensure safe access into the bay. Required building modifications to accommodate the new glovebox capability are described later in this plan.

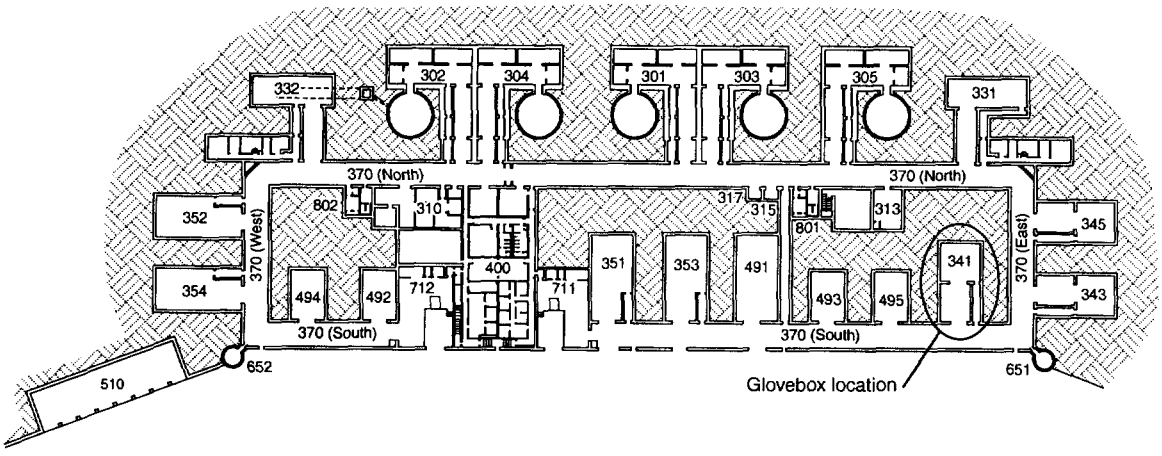

Figure 1-1. Location of gloveboxes in the Device Assembly Facility.

The first glovebox (GB-101, or target preparation glovebox) consists of three workstations for sample introduction, preparation, and inspection. This glovebox is comprised of the glovebox shell, windows, glove ports and gloves, a sphincter port, lights, an exhaust HEPA filter, a double-door transfer system, and a seismically qualified stand. Equipment such as a granite table and surface analyzer for sample measurement will be provided. The double-door sealed transfer system accepts a transfer canister that will be used to transfer material manually to the second glovebox.

The second glovebox will be a downdraft glovebox (GB-102A) connected to an open-front air hood (GB-102B) for introduction of the target assembly. GB-102A consists of the glovebox shell, windows, glove ports and gloves, a double-door transfer system, a bagport, lights, an exhaust HEPA filter, and a seismically qualified stand. The downdraft glovebox has a built-in gas circulation/ filtration system that establishes an ultraclean vertical laminar flow region within the glovebox.

The introductory hood (GB-102B) functions both as an air hood and as a glovebox. The left end of the hood has a pneumatically actuated sash/ guillotine door. When this door is open, GB-102B acts like a hood, and when down and sealed, as a glovebox. The hood exhausts through a large nuclear-grade HEPA filter. The atmosphere in the hood is air. The hood contains a slide mechanism and pneumatically actuated gate valve that allows the JASPER target holder to be inserted into the laminar flow region of the downdraft glovebox without inserting air into the inert environment.

Both GB-101 and GB-102A will be kept in an inert environment using a high-volume, nitrogen-gas, purification system (i.e., Vacuum Atmospheres "Dri-Train" system). The purifier receives nitrogen from the gloveboxes, strips oxygen and water vapor from the nitrogen, and then returns the purified nitrogen to the gloveboxes. Nitrogen circulation piping connects the gloveboxes to the nitrogen purifier.

GB-101 is considered a "hot box" (i.e., radioactive contamination allowed), and GB-102A a "cool box" (i.e., decontaminated after every use in accordance with health physics guidance). The air hood (GB-102B) can be open to the building environment and is thus a "cold" workstation. Figures 1-2 and 1-3 show a basic schematic of each of the gloveboxes.

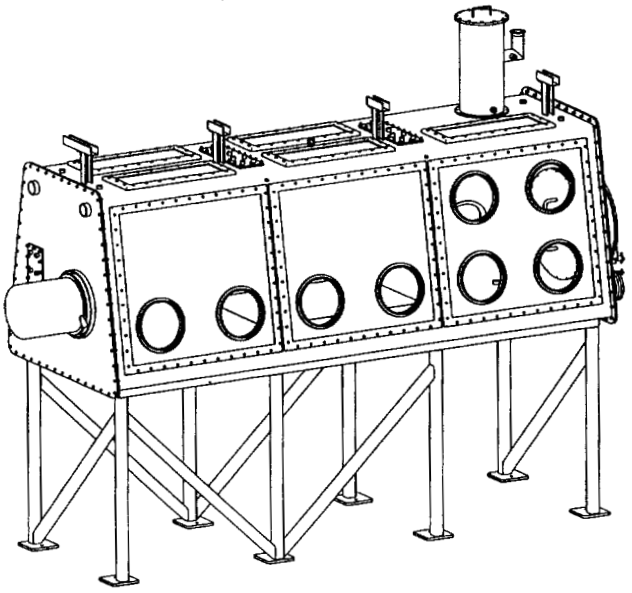

Figure 1-2. Target preparation glovebox (GB-101).

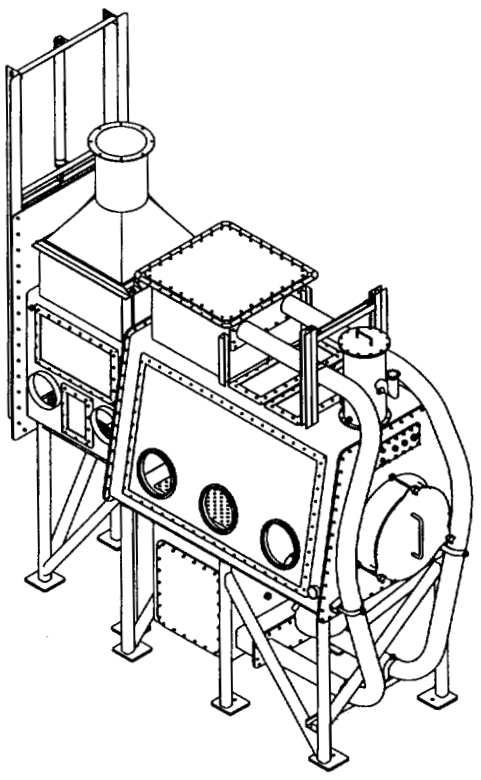

Figure 1-3. Downdraft glovebox with open-front air hood (GB-102).

2. Project Objectives

Objectives of the DAF glovebox project include the following:

- Design, construct, and make operational a glovebox that meets relevant DOE and Laboratory requirements.
- Design and construct required modifications to the DAF to achieve integration of the new glovebox capability into the facility.
- Install the glovebox into the DAF using existing facility work control and change control processes.
- Develop the required documentation for conducting operations with special nuclear material (SNM) in the glovebox.
- Demonstrate a readiness to operate using surrogate materials, preferably by participating in JASPER start-up activities.
- Receive approval to operate from DOE/NV on a schedule that is consistent with the planned first use of the JASPER facility.

3. Purpose and Scope of Project Plan

This document defines how the glovebox project will be managed and executed. It provides a path forward for establishing a glovebox capability in Building 341 of the DAF in time to meet JASPER programmatic requirements as the first user. Note that some elements of the glovebox project have been under way for some time and are more mature than others; other elements are being worked concurrently.

This plan serves the following purposes:

- Assign organizational and individual responsibilities for bringing the glovebox capability online.
- Coordinate activities between organizations.
- Facilitate communication between project members and management.
- Identify the mechanisms used to manage and control the project.

The scope of this plan includes all activities conducted to achieve project objectives, culminating in DOE/NV approval to operate. This plan does not address the issues associated with the steady-state operation of the glovebox.

4. Responsibilities

The DAF glovebox project is being executed by a multiorganizational, multidisciplinary start-up team. LLNL is the lead Laboratory for the start-up project, which includes participation of DOE/NV, LANL, and BN employees. Each organization retains direct line authority over their employees while functioning as a supplier to the overall start-up process. The project managers are responsible for defining who, how, and how well the project sub-tasks are performed within their respective organizations. An organization chart for the start-up project is provided as Figure 4-1.

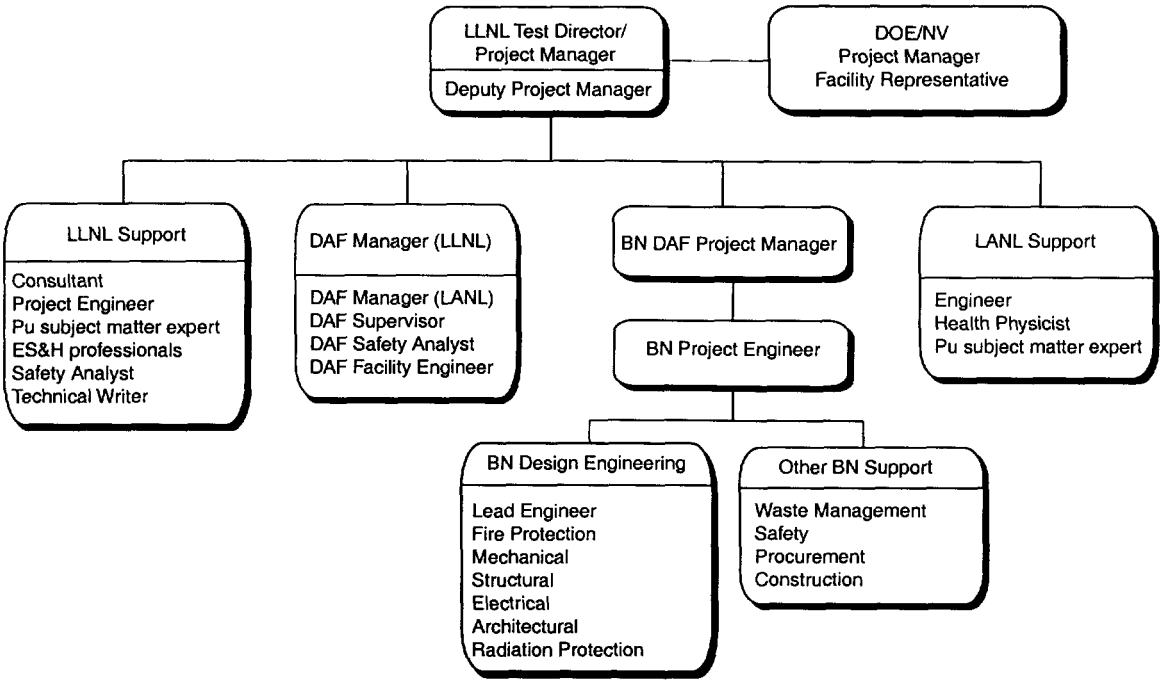

Figure 4-1. Organization of DAF glovebox start-up project.

4.1 DOE/NV

As an NTS project using DOE/NV resources, the DAF glovebox project falls under the purview of the DOE/NV Stockpile Stewardship Division. Key players include a DOE Project Manager and a DOE DAF Facility Representative. The DOE/NV Manager is responsible for authorizing start-up of the glovebox capability.

4.1.1 DOE Project Manager

Responsibilities include:

- Assure that the work is within the scope, procedures, and plans as they apply to the DAF mission under the Stockpile Stewardship Program.
- Provide funding commensurate with the requirements to fulfill mission needs.

- Facilitate obtaining DOE/NV approval to operate, including the Real Estate/Operations Permit (REOP) process for glovebox operations and required readiness reviews.

4.1.2 DOE DAF Facility Representative

Responsibilities include:

- Provide DOE oversight for all DAF activities.

4.2 Lawrence Livermore National Laboratory

LLNL has two significant responsibilities with respect to the glovebox project: lead Laboratory responsibility for the project, and lead Laboratory responsibility for management of DAF operations. Other organizational responsibilities include:

- Provide design requirements and criteria for the glovebox.
- Define user program interface requirements.
- Provide analyses to support DAF glovebox operations.
- Provide support to DAF operations to assure an integrated process.
- Perform acceptance test procedures (ATPs) for the glovebox and modifications to the DAF.

Key players and their responsibilities are identified in the following subsections.

4.2.1 Test Director

The Test Director serves as the overall project manager and is accountable for the success or failure of the glovebox project. Generic responsibilities for this position are defined in the *Nevada Experiments and Operations Program (N Program) Management Plan* (Ref. 5). As stated in that document, the Test Director's primary responsibility is to manage and execute major LLNL projects that use DOE/NV resources. Responsibilities related to the DAF glovebox project include:

- Provide single-point accountability for accomplishing project objectives.
- Provide overall vision, policy, standards, mission definition, objectives, and strategy for project.
- Assure that adequate and highly qualified personnel are available to support project objectives.
- Set priorities and resolve conflicts, as required.
- Manage change, including assurance that interpretation and changes to all agreements are adequately documented.

- Follow established DAF work control processes to introduce the glovebox into the DAF.
- Prepare a project plan, which includes the development and maintenance of the project budget and schedule.
- Ensure adequacy of hazard analysis effort, including development of controls for the hazards associated with the work activities.
- Chair project review meetings and provide project status to upper-level line management.

A Deputy Project Manager has been assigned to the project and will assist the Test Director in accomplishing the above responsibilities.

4.2.2 DAF Manager

As the Facility Manager for the DAF, this individual oversees all DAF responsibilities. Generic responsibilities for a facility manager are defined in the *Nevada Experiments and Operations Program (N Program) Management Plan* (Ref. 5) Responsibilities are also identified in numerous DAF plans and procedures. Responsibilities related to the DAF glovebox project include:

- Assure that interfacing facility structures, systems, and components (SSCs) are in an operational state to support glovebox operations.
- Assure that the incoming project is evaluated against the approved safety envelope and authorization basis for the facility.
- Make available DAF resources, including assigning DAF personnel to support the project.
- Assure adequate staff support to meet project schedule.
- Serve as a member of the DAF Facility Operations Review Committee (FORC).
- Assure the development of a revised Real Estate/ Operations Permit (REOP) prior to initiating glovebox operations.
- Manage readiness review activities.

4.2.3 DAF Supervisor

Responsibilities related to the DAF glovebox project include:

- Receive work request from user Laboratories and process request through approved DAF work control processes.
- Initiate review and revision of affected DAF plans and procedures to accommodate glovebox requirements.

- Serve as a member of the DAF FORC.
- Participate in design reviews and other project reviews as requested.
- Serve as the lead for communicating DAF-specific requirements to other individuals on the project.

4.2.4 DAF Facility Engineer

Responsibilities related to the DAF glovebox project include:

- Assure the availability of Building 341 SSCs to support facility modifications.
- Oversee the design planning process, and assure that all design changes will meet DAF requirements.
- Oversee the building modification process, including acceptance tests for new and modified systems.
- Participate in design reviews and other project reviews as requested.

4.2.5 DAF Safety Analyst

Responsibilities related to the DAF glovebox project include:

- Prepare unreviewed safety question (USQ) documentation for JASPER target assembly processing.
- Provide technical guidance to the Laboratories in the preparation of glovebox safety analysis documentation.
- Serve as a member of the DAF FORC.
- Participate in design reviews and other project reviews as requested.
- Provide support for review and approval of modifications to accommodate the glovebox.

4.2.6 Glovebox Subject Matter Expert

Responsibilities related to the DAF glovebox project include:

- Provide technical guidance in the development of design requirements.
- Participate in design reviews and other project reviews as requested.
- Prepare glovebox operating procedures to comply with ES&H requirements.
- Develop glovebox training and qualification procedures.
- Develop/prepare JASPER-specific procedures.

4.2.7 JASPER Project Manager

Responsibilities related to the DAF glovebox project include:

- Assure that DAF glovebox interfaces meet JASPER target requirements.
- Assure accuracy of procedures for JASPER target assembly.

4.3 Los Alamos National Laboratory

LANL serves in a consulting/advisory role to review plans, drawings, process equipment, and procedures to assure that relevant lessons learned from similar operating experience is incorporated into the design and operation of the DAF glovebox.

4.4 Bechtel Nevada

BN, the DOE/NV performance-based management and operating (M&O) contractor at the NTS, is the principal DOE/NV contractor interfacing with LLNL on the DAF glovebox project. BN is responsible for providing engineering, construction, inspection, and related technical services for the procurement and installation of the glovebox. Organizational responsibilities include:

- Procure glovebox design, fabrication, and installation services.
- Procure glovebox, filtration, and other containment systems and equipment.
- Design and construct DAF modifications.
- Install glovebox and related equipment.
- Support performance of ATPs.
- Support readiness review activities.

Key players and their responsibilities are identified in the following subsections.

4.4.1 BN Project Manager

Responsibilities related to the DAF glovebox project include:

- Serve as the BN single point-of-contact responsible to the DAF Manager for support services.
- Serve as the BN single point-of-contact responsible to the LLNL Test Director for management of project schedule and budget.
- Manage BN glovebox resources.

4.4.2 *BN Project Engineer*

Responsibilities related to the DAF glovebox project include:

- Prepare and modify system design descriptions (SDDs) for new or modified SSCs to support the glovebox capability.
- Prepare design packages for construction activities in accordance with approved DAF processes.
- Procure needed parts/systems to support glovebox operations.
- Prepare change packages to support DAF facility modifications.
- Serve as technical representative with glovebox design and fabrication subcontractors.
- Provide engineering disciplines to support glovebox installation and DAF modifications. Required disciplines include:
  - Civil/structural
  - Architectural
  - Mechanical
  - Plumbing
  - Electrical
  - Fire protection
  - Radiation protection

4.4.3 *BN Construction Superintendent*

Responsibilities related to the DAF glovebox project include overseeing and coordinating operations of crafts and maintenance personnel during construction, glovebox installation, and pre-start phases.

4.4.4 *BN Subcontractors*

Under subcontract to BN, Merrick Engineers and Architects (Merrick) will prepare the final glovebox design and procurement package. Deliverables include drawings, calculations, analyses, specifications, and supporting technical data that constitute the glovebox procurement package.

The glovebox manufacturer (subcontract to be awarded) will fabricate the glovebox and provide oversight and technical support for its installation.

4.5 Project Team Members

Generic responsibilities for "Individual Workers" are specified in the *Nevada Experiments and Operations Program (N Program) Management Plan* (Ref. 5). Other responsibilities include:

- Understand what is expected of them and what their relationship is to others.
- Manage their discrete piece of the total project to support overall project schedule.
- Participate in design reviews and other project reviews as requested by their organizational project manager.

5. Project Elements

This section defines actions and tasks that are major components of the glovebox start-up effort.

5.1 Project Management

5.1.1 Formation of Start-up Team

The inter-organizational glovebox team is comprised of personnel from LLNL, LANL, and BN. Participation may be full- or part-time. Membership of the team is determined by the LLNL Test Director and varies with the needs of the project. Key participants with assignments effective as of the date of this document are provided as Attachment 1. In addition to those individuals identified, the team will include strong participation by other Laboratory and contractor personnel.

5.1.2 Management Documents

This project plan is the top-tier management document for the glovebox project. It defines responsibilities of the key participants and identifies those management elements required to keep the project on budget and schedule. BN has prepared a Support Execution Plan (Ref. 6) that provides more information about how BN plans to fulfill its responsibilities on the glovebox project. A listing of supporting project management documents is provided in Table 5-1.

Table 5-1. Supporting project management documents.

Document title	Document number	Responsible organization
Support Execution Plan for the Device Assembly Facility (Ref. 6)	SEP-2130-09	BN
Task and Activity Description for the DAF Glovebox (Ref. 7)	Part of Support Execution Plan (Appendix B)	BN
Engineering Plan for Pu Glovebox in Building 341 at DAF (Ref. 8)	EAS 99-2	BN

5.1.3 Applicable Standards and Requirements

The glovebox will be designed, fabricated, and installed to meet the following requirements:

- AGS-G001, *Guideline for Gloveboxes* (Ref. 9).
- DOE O 6430.1A, *General Design Criteria* (Ref. 10).
- DOE O 420, *Facility Safety* (Ref. 11).
- DOE G 420.1-1, *Nonreactor Nuclear Safety Design Criteria and Explosive Safety Criteria for Use with DOE O 420.1, Facility Safety* (Ref. 12).
- DOE-STD-1020-94, *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities* (Ref. 13).
- 10 CFR 830, *Nuclear Safety Management* (Ref. 14).
- ASME NQA-1, *Nuclear Quality Assurance* (Ref. 15).

Performance, functional, and operating/technical requirements for the glovebox have been prepared by LLNL. Key design parameters are provided in Table 5-2.

Table 5-2. Key design parameters for DAF glovebox system.

Parameter	Value
Glovebox material limit	200 g Pu
Oxygen concentration in gloveboxes	< 1 ppmv
Water vapor concentration in gloveboxes	< 1 ppmv
Nominal differential pressure between confinement systems	–0.5 in. WG between gloveboxes and secondary confinement enclosure
	–0.2 in. WG between secondary enclosure and tertiary system (B341)
	–0.075 in. WG between Building 341 and DAF corridor
Nitrogen flow rate in glovebox	> 10 standard ft^3/min
Hood flow rate	50–150 linear ft^3/min
Nitrogen supply	20–60 psi
Service air to support Dri-Train	20–60 psi
Seismic requirements	Consistent with DOE-STD-1020 (PC-3)
Allowable leak rate of glovebox	10^{-6} standard cm^3/s

5.1.4 Work Control Requirements

Work control requirements at the NTS are specified in NV O 412.X3, *Work Control* (Ref. 16), and implemented through the LLNL *ES&H Manual*, Volume VI, procedure NTO-NTS-110, *Work Control* (Ref. 17). As stated in that document, the DAF operates under its own work control process. The controlling DAF plans and procedures include:

- DAF-PLN-MG-02, *Technical Operations Plan* (Ref. 18), which includes requirements for introducing project work into the DAF. In accordance with this document, a Work Request Form has been coordinated with the appropriate DAF Supervisor and submitted to the DAF Manager to begin the process of review and authorization of the glovebox project.
- DAF-PRC-AD-04, *Unreviewed Safety Questions Procedure* (Ref. 19), describes the process for evaluating proposed projects against the approved DAF authorization basis. This process has been initiated as described in Section 5.5.
- DAF-PRC-AD-19, *Change Request Procedure* (Ref. 20), will be used to initiate any facility modifications and procedures to support glovebox installation and operation.

- DAF-PRC-AD-20, *Change Package* (Ref. 21), defines required documentation and processes for initiating significant design changes.
- DAF-PRC-AD-21, *DAF Approval* (Ref. 22), describes the function of the DAF Facility Operations Review Committee (FORC) in reviewing and authorizing work activities.

Although the glovebox can be considered an upgrade to existing DAF capabilities, it will be managed as a project request (i.e., JASPER target assembly requirement) for purposes of work control. The start-up team will assure that work control mechanisms are effectively applied and properly integrated into project activities.

BN also has organizational work control requirements to control the portion of the project for which they are responsible. These controls are specified in the *Support Execution Plan for the Device Assembly Facility* (Ref. 6), and more specifically in Appendix B of that document, "Task and Activity Description for the DAF Glovebox" (Ref. 7).

Currently, LLNL holds the primary REOP for DAF operations. During construction activities to support building modifications and glovebox installation, a secondary REOP for Building 341 and associated systems will be issued to BN in accordance with NV M 412.X1, *Real Estate/ Operations Permit* (Ref. 23). Following turnover of the installed systems to the Laboratories, an interim REOP will be issued to cover preoperational and readiness review activities prior to a final REOP for actual glovebox operations.

LLNL Integration Work Sheets (IWSs) shall be prepared and approved prior to initiating the following activities:

- Glovebox start-up activities.
- Actual glovebox operations.

5.1.5 Budget and Funding Sources

Funding for BN activities to support the glovebox project is provided by the DOE/NV Stockpile Stewardship Division. This funding is part of DOE/NV defense programs work for DP-10 campaigns, Directed Stockpile Work (DSW), and Readiness in Technical Base and Facilities (RTBF). A summary funding allocation for the DAF glovebox project is provided in Table 5-3. A more detailed resource-loaded schedule will be developed to define actual budget requirements and determine whether this allocation is sufficient to meet project requirements. As shown in the table, the total BN project funding allocation is $2.9M.

LLNL funding to manage and support the glovebox project is provided by the Defense and Nuclear Technologies (DNT) Directorate through the Nevada Experiments and Operations (N) Program. In FY01, $700K has been earmarked for Laboratory personnel effort to support glovebox start-up operations.

Table 5-3. Allocated DOE/NV funding for DAF glovebox start-up project.

Task name	FY00 ($K) (received)*	FY01 ($K) (programmed)*
Glovebox design	100	30
Procurement support	100	100
Glovebox fabrication/ installation		500
DAF modifications (design, construction, and equipment)	270	1200
Authorization basis	30	100
Conduct of operation		300
Start-up operations		170
Project totals	500	2400

* Reflects BN costs only.

5.1.6 Project Schedule/ Work Breakdown Structure

A detailed project schedule has been developed to identify key tasks and timelines and responsible individuals for completing those tasks. The schedule/WBS is a top-down subdivision of the total project into major work assignments, with the last tier consisting of work tasks. The schedule is the basis for establishing organizational and individual accountability and resource (time and cost) estimates, and provides single-point accountability for every task in the process. It integrates requirements and actions for the user Laboratories, BN, and DOE/NV personnel, and serves as a checklist for every activity that must be performed to complete the project. The schedule has been keyed to meet JASPER project requirements. The schedule is divided into the following major functional areas:

- Building 341 modifications.
- Glovebox engineering.
- Glovebox procurement.
- Authorization basis.
- Glovebox construction.
- Integrated testing.
- Conduct of operations.
- Start-up operations.

Major milestones for the project are provided in Table 5-4.

Table 5-4. Major milestones for DAF glovebox project.

Milestone	Target date*
Conduct glovebox 90% design review (Merrick)	Oct 16-17, 2000
Receive 100% design package	Oct 23, 2000
Issue Building 341 design drawings for construction	Nov 8, 2000
Issue request for proposal (RFP) for glovebox fabrication	Nov 9, 2000
Complete glovebox hazard and accident analysis	Dec 29, 2000
Award glovebox fabrication/installation subcontract	Jan 29, 2001
Complete modifications to DAF plans/procedures	Feb 8, 2001
Complete glovebox procedures	April 18, 2001
Receive glovebox at DAF	April 23, 2001
Assign operating personnel	May 9, 2001
Turnover glovebox and facility systems from BN to LLNL	May 9, 2001
Complete integrated testing of glovebox and facility systems	June 7, 2001
Complete glovebox hands-on training	June 21, 2001
Conduct readiness reviews	July–Aug, 2001
Receive authorization to operate	Aug 31, 2001

* Scheduled milestones may adjust as the project evolves or as priorities change.

The schedule provides a baseline for monitoring project progress, allowing for identification of variances and for timely action to mitigate impact of problems should they arise. BN is responsible for providing status of the project schedule twice a month.

5.1.7 Project Meetings

The LLNL Test Director will hold project team meetings nominally every week to assure that the project is on track. All project members are encouraged to participate. The purpose of these project review meetings is to:

- Provide open communication between project team members and management.
- Identify significant issues before they become problems.
- Identify opportunities for schedule acceleration, cost reduction, or technical improvement.
- Facilitate the comparison of actual project performance to plan.
- Identify significant deviations from the plan, and assure corrective action if needed.

- Identify individuals who will be responsible for action to resolve each task, and follow-up on previous action assignments.

The BN Project Manager will distribute meeting minutes of findings, decisions, and action item assignments to all team members.

5.1.8 Project Reviews

The LLNL Test Director will evaluate project status and effectiveness at the completion of each major phase of the project and communicate the results to the LLNL N Program Leader and other interested parties. These reviews will be tracked through the project schedule and documented upon completion.

5.2 Glovebox Design

Preliminary design work on the DAF glovebox was initiated by LANL under subcontract to Merrick Engineers and Architects (Merrick). A preliminary review (30%) of the glovebox design was conducted on October 27, 1999. Decisions, action items, questions, and comments deriving from this review are summarized in JASPER project documentation (Ref. 24). The status of these items was communicated to the JASPER Project Manager by memorandum (Ref. 25).

In June and July of 2000, LLNL engineering departments held design reviews of the glovebox concept. Significant design changes were recommended, including the addition of the downdraft glovebox (Refs. 26, 27). Due to facility layout, the two gloveboxes were later separated.

In August 2000, BN awarded a sole-source subcontract to Merrick to complete the final glovebox design and to prepare the procurement package. An informal 60% design review was conducted on August 29-30, 2000 and documented in a conference report (Ref. 28). A 90% design review occurred on October 16–17, 2000, with delivery of a complete design package shortly thereafter. Deliverables include drawings, calculations, analyses, specifications, and supporting technical data that constitute the glovebox procurement package.

5.3 Glovebox Fabrication and Installation

BN will initiate a request for proposal (RFP) to fabricate and install the glovebox in Building 341 of the DAF, and will award a subcontract to a glovebox manufacturer for this work. This procurement will cover the basic glovebox with integrated equipment (e.g., dri-train nitrogen-purification system), required measuring instrumentation, and a granite table. This procurement will occur concurrently with the development of a preliminary hazard analysis document. BN will manage the subcontractor processes and install the glovebox with subcontractor oversight. Deliverables include complete design and specification packages, which will serve as the basis for developing system design descriptions (SDDs).

5.4 DAF Preparations and Modifications

Several tasks must be completed for successful integration of the glovebox into the DAF. These include:

- Making Building 341 operational. This task includes performing all required maintenance activities.
- Identification and definition of system interfaces. BN will prepare a systems interface control document as the design definition of the glovebox and required facility modifications matures. Existing SDDs will be updated to include description of the new system interfaces, and new SDDs will be written for new systems associated with the glovebox. Candidate systems include:
  - Secondary confinement enclosure.
  - Nitrogen supply.
  - Glovebox ventilation and filtration.
  - Secondary enclosure ventilation and filtration.
  - Electrical distribution, including backup power.
  - Radiation monitoring systems.
  - Fire protection systems.
- Physical modifications to DAF (including engineering, procurement, and construction). BN will design the modifications required to house and support the glovebox and related equipment in existing DAF structures and systems. Major modifications to the DAF will include construction of a secondary confinement structure, including a mezzanine for equipment; construction of an air-lock vestibule; the addition of a room-temperature gaseous nitrogen supply to the gloveboxes; removal of the task exhaust system; and installation of a vendor-provided glovebox ventilation system. Building ventilation systems, lighting, electrical power, inert gases, communications, and fire protection/alarm systems will be modified as required to support the glovebox. Radiation protection equipment associated with the glovebox includes a whole-body alpha counter, a hand-and-foot counter, and continuous air monitors (CAMs).

  The basic approach for completing these design changes includes:

  - BN will prepare and release building modification packages for the following areas:
    - Demolition
    - Civil/structural

  - ♦ Mechanical/electrical
  - ♦ Instrumentation and controls
  - ♦ Glovebox system
- The DAF FORC and LLNL/LANL disciplines will review the design packages.
- Design reviews will be held.
- BN will provide formal design packages to the DAF FORC for approval.

Physical and documentation changes related to glovebox systems and DAF modifications will follow the DAF Configuration Management Program (Ref. 29).

- Modifications to DAF operating processes. The DAF Supervisor will initiate review and revision of existing DAF plans and procedures to accommodate glovebox requirements.
- Modifications to DAF maintenance procedures. BN will initiate review and revision of DAF-specific maintenance procedures to include any unique features of Building 341 systems and interfaces within the glovebox.

5.5 Authorization Basis

The current DAF authorization basis is documented in the DAF Safety Analysis Report (Ref. 2), Final Environmental Assessment (Ref. 30), and Nuclear Explosive Safety Studies (Ref. 31). Because glovebox operations have not been reviewed in these documents, the DAF unreviewed safety question (USQ) process has been initiated for this work. In accordance with DAF-PRC-AD-04, *Unreviewed Safety Question Procedure* (Ref. 19), the DAF Safety Analyst is responsible for documenting the USQ determination and requesting DOE/NV approval for activities outside the current authorization basis. The Safety Analyst has determined the USQ to be positive.

The plan for approving DAF glovebox operations includes:

- Building 341 hazard categorization. Preliminary hazard and accident analyses conducted in accordance with DOE-STD-1027 (Ref. 1) indicate that on the basis of material quantities and operations, the glovebox facility (Building 341) is a Category 3 nuclear facility. This hazard categorization is different from the current DAF categorization of a moderate-hazard explosives facility (determined in accordance with DOE Order 5481.1B [Ref. 32]). The DAF SAR is currently undergoing revision to comply with DOE O 5480.23 (Ref. 33) and will likely be recategorized as a Category 2 nuclear facility during this process.
- Preparation of hazard/accident analyses for glovebox operations. Operational hazards will be assessed and documented to establish requirements for engineered barriers and administrative controls that will form the safety

envelope for glovebox operations. An accident analysis will also be conducted to determine credible accident scenarios and potential radiological releases from glovebox operations. This hazard and accident analysis document will follow the content and format guidance contained in Chapters 2 through 5 of DOE-STD-3009-94 (Ref. 3). In the future, the updated DAF SAR will incorporate the hazards identified in this hazard/accident analysis document.

- Performance of fire hazard analysis. Fire hazards, fire loading, and associated engineered and/or administrative controls associated with the DAF glovebox will be documented. A preliminary fire hazard analysis will be published prior to a final analysis.
- National Environmental Policy Act (NEPA) considerations. Preliminary investigation of NEPA considerations indicates that glovebox operations fall under the current DAF mission and hence the current Environmental Impact Statement (EIS) (Refs. 34, 35). An environmental survey of the nitrogen tank area, if located in a previously undisturbed area outside the DAF, will be conducted prior to construction for endangered species and antiquities.
- National Emission Standards for Hazardous Air Pollutants (NESHAP) considerations. Concurrence from the Environmental Protection Agency (EPA) will be sought that concludes that a construction permit is not required under 40 CFR 61, *National Emission Standards for Hazardous Air Pollutants.*

5.6 Conduct of Operations

5.6.1 Staffing Plan

To meet manpower requirements associated with the glovebox capability, a new DAF management position will be created. A third DAF Supervisor will be selected specifically to manage glovebox operations. Currently, there are two DAF Supervisors, one each for LLNL and LANL operations, respectively. The new DAF Supervisor position will be posted and selected on the basis of defined minimum qualifications and experience. These qualifications will be equivalent to those of an LLNL Senior Certified Fissile Material Handler. Required training for the successful candidate will be identified, documented, and implemented prior to authorization to operate.

Hands-on users of the glovebox must be Certified Fissile Material Handlers. Training and qualification requirements will be included in DAF-PLN-MG-03, *Training and Qualification Plan* (Ref. 36).

5.6.2 Required Documentation

In addition to documentation requirements covered in other sections of this plan (see Sections 5.4 and 5.5), the following documents will be prepared to ensure that the glovebox capability can be operated safely and that authorization to operate is warranted:

- Glovebox operating and surveillance procedures. These procedures will be written in accordance with the requirements of DAF-PRC-AD-01, *Preparing and Reviewing DAF Plans and Procedures* (Ref. 37), and incorporated into the DAF controlled document system when completed. They will include procedures for loading/unloading materials, bag-outs, radiological surveys, and glove changes.

- JASPER target assembly procedures. These procedures will include instructions for building up a JASPER target assembly, and processes for returning a target should it arrive out of specification. These documents are user documents that must meet requirements specified in DAF-PLN-MG-02, *Technical Operations Plan* (Ref. 18), for incoming projects.

- Glovebox operator training and qualification procedures. In coordination with the LLNL Nuclear Materials Technology Program (NMTP) Training Manager, training and qualification requirements for the glovebox operators (as described in Section 5.6.1 above) will be incorporated into DAF-PLN-MG-03, *Training and Qualification Plan* (Ref. 36).

- Glovebox maintenance procedures. These procedures will define interfaces and responsibilities for maintaining the glovebox and associated systems.

5.7 Assessment of Readiness to Operate

The process used to demonstrate operational readiness is a function of facility hazard categorization. Preliminary hazard and accident analyses conducted in accordance with DOE-STD-1027 indicate that the glovebox facility (Building 341) is a Category 3 nuclear facility. As such, the following requirements apply:

- Internal self-assessment by project team. Prior to any scheduled external review, the glovebox start-up team will assess its readiness to begin operations. This self-assessment will assure readiness of plant, personnel, and procedures. This process will be conducted in accordance with DAF-PRC-TO-03, *Project Introduction* (Ref. 38), and will include the development of checklists by DAF core team members to systematically evaluate whether all requirements and conditions are met.

- Start-up process. A formal start-up process will be followed to demonstrate operational readiness of the glovebox facility. A start-up plan will be developed prior to initiating the process.

- Independent readiness review. A Contractor Operational Readiness Review (CORR) or equivalent will be conducted to provide an independent confirmation of readiness to start glovebox operations. Descriptions and implementation plans for this review will be documented and approved prior to initiation. The CORR process is the responsibility of the DAF Manager.

- Operational Readiness Review (ORR). As a final step in confirming readiness to start glovebox operations, a formal ORR will be conducted. Requirements

for this review are provided in NV M 412.X2 (Ref. 39), DOE O 425.1A (Ref. 4), and DOE-STD-3006 (Ref. 40). Descriptions and implementation plans for this review will be documented and approved prior to initiation. The ORR process is the responsibility of the DOE/NV Project Manager. The approval authority for DAF glovebox operations is the DOE/NV Manager.

6. References

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10. DOE O 6430.1A, *General Design Criteria*, U. S. Department of Energy, Washington DC, April 6, 1989.
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18. Device Assembly Facility, Nevada Test Site, DAF-PLN-MG-02, *Technical Operations Plan.*

19. Device Assembly Facility, Nevada Test Site, DAF-PRC-AD-04, *Unreviewed Safety Questions Procedure.*

20. Device Assembly Facility, Nevada Test Site, DAF-PRC-AD-19, *Change Request Procedure.*

21. Device Assembly Facility, Nevada Test Site, DAF-PRC-AD-20, *Change Package.*

22. Device Assembly Facility, Nevada Test Site, DAF-PRC-AD-21, *DAF Approval Process.*

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24. Joint Actinide Shock Physics Experimental Research Facility, Nevada Test Site, JAS-DR-09, *DAF Glovebox Preliminary Design Review Action Items.*

25. Memorandum from S. M. Pratuch to T. Valk, "Status of Action Items from the Glovebox Design Review," Lawrence Livermore National Laboratory, Livermore, CA, July 28, 2000.

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Attachment 1. DAF Glovebox Project Team Personnel

Name	Role
Mark Martinez	Test Director
Mike Butler	LLNL Deputy Project Manager
Jim Page	LLNL Consultant
James Raymond	LLNL Senior Pu Handler
Rick Higgs	DAF Manager (LLNL)
John Flam	DAF Supervisor (LLNL operations)
Mohsen Sharirli	DAF Safety Analyst
Mel Millet	DAF Facility Engineer
Ted Valk	JASPER Project Manager
David Prokosch	LLNL ES&H Team Leader
Jim Mecozzi	LLNL Health Physicist
Chin Ma	LLNL Safety Analyst
Doug Serpa	LLNL ES&H Support
Lori McElroy	Technical Writer
Steve Fellows	DAF Manager (LANL)
David Post	LANL Project Support
Tom Short	LANL Engineer
David Wannigman	LANL Health Physicist
Jim Pedalino	BN DAF Project Manager
Joe Calovini	BN Project Engineer
Roy White	BN Design Lead Engineer
Russ Svab	BN Fire Protection Engineer
Gerry LaRoy	BN Lead Mechanical Engineer
Vinod Sahni	BN Lead Structural Engineer
Joe Dumas	BN Lead Electrical Engineer
Judy Schill	BN/DAF Waste Management Officer
Judy Kallas	BN/DAF Glovebox Safety Engineer
Chuck Schaefer	BN Procurement Lead
Scott Doney	BN DAF Quality Assurance Engineer